SURVEILLANCE OF NOSOCOMIAL INFECTIONS

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Your taxes at work

What is a Nosocomial Infection ?

- An infection which is acquired during hospitalization and which was not present or incubating at the time of admission
- An infection which is acquired in the hospital and becomes evident after discharge from the hospital
- A newborn infection which is the result of passage through the birth canal .

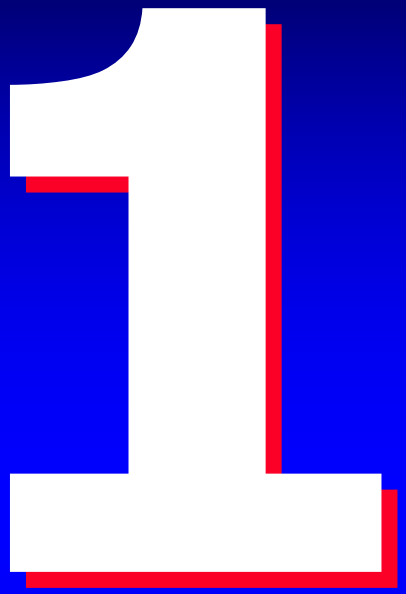
What is a Nosocomial Infection ?

Practically to establish that an infection is hospital acquired,

SHOW THAT the patient:

- 1- HAS AN INFECTION, not a simple colonization
- 2- WAS NOT infected at the time of admission
- 3- HAD SUFFICIENT TIME to develop infection,

True Infection NOT Colonization



- Infection are accompanied by signs and symptoms of infection:
  - $\rightarrow$ fever, malaise
  - $\rightarrow$ in localized infections: swelling due to inflammation, heat, pain, erythema (tumor, dolor, rubor, calor)
- Use definitions which establish minimum characteristics for infection
- Remember: Immunocompromised patients do not show signs of infection as normal patients Neutropenic patients ($\leq$500 neutrophils /mm3) show no pyuria, no purulent sputum, little infiltrate and no large consolidation on chest X-ray

NO Infection at Time of Admission

2

- establish prior negativity
- check history, symptoms and signs documented at time of admission, lab tests & chest X-rays done
- -normal physical examination,
- -absence of signs and symptoms,
- -normal chest X-ray,
- -negative culture or lack of culture

For example if urine cultures are collected at day 7 of hospitalization and none was collected before, it implies that no signs of infection were present in urine before.

Sufficient Time to Develop Infection

3

- diseases with specific incubation period: stay in hospital ≥ incubation period
- numerous infections do not have well set incubation periods (for example, staphylococci, E.coli infections)

  these infections rarely develop in less than 2 days.

To establish a nosocomial infection meeting the definition criteria is sufficient there is no need to have proof *beyond the shadow of a doubt*

CDC definitions for nosocomial infections, 1988.
Am J Inf Ctrl 16 (3): 128-140

Rates: Numerators

- Number of infections
- Number of patients infected
- Note:
  - →Infections caused by **multiple organisms of similar origin** at the same site = single infection
  - →In a patient with a previously established nosocomial infection, a **second nosocomial infection** should be recorded in two situations:
    1. the appearance of clinical infection at a new and different site
    2. the appearance in culture of new and different organisms if deterioration in patient's condition.

Rates: Denominators

- Number of patients admitted (or discharged)
- Number of hospital days
- Number of device days

Hospital wide Rates

- Hospital wide nosocomial infection rate /100 Admissions for a given period: month, quarter, year.

$$= \frac{\text{Number of nosocomial infections}}{\text{Number of patients admitted}} * 100$$

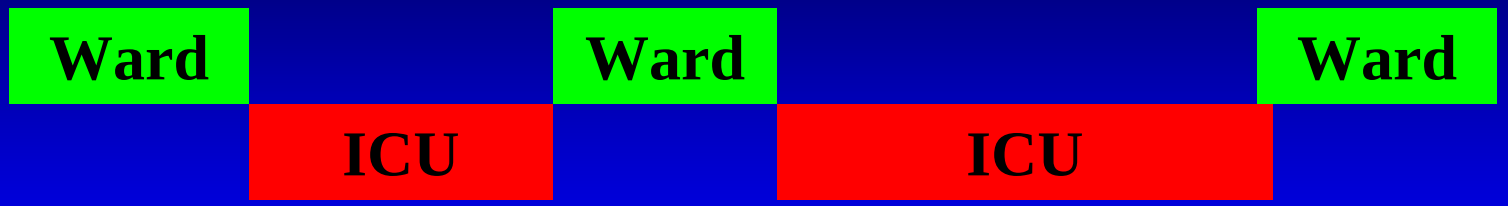
In this rate a patient with 2 infections is counted twice

- Hospital wide patient infected rate /100 Admissions for a given period: month, quarter, year.

$$= \frac{\text{Number of patients infected}}{\text{Number of patients admitted}} * 100$$

In this rate a patient with 2 infections is counted only once

Ward Specific Rates



- Rate of infection /1,000 HD

= Number of infections *1000
Number of hospital days

- Rate of Patients infected /1,000 HD

= Number of patients infected *1,000
Number of hospital days

Device Specific Rates, Procedure Specific Rates

- Surgical Site Infection rate:

$$= \frac{\text{Number of surgical site infections}}{\text{Number of patients operated on}} * 100$$

- Ventilator Associated Pneumonia rate:

$$= \frac{\text{Number of ventilator associated pneumonia}}{\text{Number of patients on ventilator.days}} * 1{,}000$$

- Catheter Related Blood Stream Infection rate:

$$= \frac{\text{Number of Catheter related BSI}}{\text{Number of patients on IV line .days}} * 100$$

Utilization rate:

- The Device Utilization Rate (DUR) is the proportion of patient days for which a certain device is used

- DUR are specific to a certain device: catheter, IV line, ventilator
- DUR reflects the amount of devices used and is a reflection of the patient severity.

$$= \frac{\text{Number of Device Days}}{\text{Number of Patient.Days}} * 100$$

NNIS

- National Nosocomial Infections Surveillance = NNIS
- Started in 1970 with 62 hospitals
- Provide acute care, 100+ beds, ≥ 1 ICP
- Not necessarily representative of all acute care hospitals
- Progressively extended to 300 hospitals in 42 states
- Voluntary, confidential
- Benchmark rates published for inter-hospital comparisons
- Comprehensive hospital-wide surveillance carried out until 1991, discontinued in 1998
- Replaced by targeted surveillance

NHSN

- National Health Safety Network = NNIS
- Designed to facilitate participation by large number of hospital
- Expand enrollment to other types of health care settings

NHDS

- National Hospital Discharge Survey = NHDS
- Probability survey of characteristics of in-patients discharged from non-federal short-stay hospitals in the US
- 3 stage random sampling:
  - Geographic areas: counties
  - Hospitals
  - Patient discharges
- Patient age, gender, diagnoses, procedures, admission & discharge dates
- 2002: 445 hospitals, 37.5 million discharges

Estimates of Health Care Associated Infections in USA
Klebens RM et al, 2002. Public Health reports 122: 160

- 176.4 million patient days (PD)
  - 93% in children & adults
  - 7% in newborns
- 1.7 million HAI
- 99,000 deaths
- Rates
  - ICU 13 /1,000 PD
  - High risk nursery 7 /1,000 PD
  - Well baby nursery 3 /1,000 PD

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Rates of infections / 1,000 PD

	Well Baby	Hi risk nursery	ICU (Adult & children)
UTI	0.19	0.5	3.38
BSI	0.76	3.1	2.71
Pneumonia	0.24	0.9	3.33
SSI	0.003	0.2	0.95
Other	1.37	2.21	2.67
Total	2.56	6.88	13.0